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DOES INVESTING ABROAD REDUCE DOMESTIC ACTIVITY? EVIDENCE FROM ITALIAN MANUFACTURING FIRMS

by Raffaello Bronzini*

Abstract

The aim of this paper is to evaluate whether domestic and foreign activities of Italian firms are mainly substitutes or complements. We take advantage of a unique firm-level panel data set from the Bank of Italy Survey of Industrial and Service Firms, which provides information on the international activity of a representative sample of Italian enterprises. We use matching methods to compare the performance of firms that become multinationals with that of firms that had considered the possibility to invest abroad, but had not yet done so. Using a different approach, we supplement the counterfactual strategy by studying the conditional over-time correlation between domestic and foreign employment of a sample of multinational firms. Both methods suggest that domestic and foreign activities are more likely to be complements than substitutes. The positive correlation between domestic and foreign employment is higher for the domestic highly-skilled workforce and for firms that have adopted complex strategies of internationalization.

JEL Classification: F2, L6, J0.
Keywords: foreign direct investment, multinational enterprises, matching, delocalization.

Contents

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1. Introduction[1]

The increasing internationalization of production and its effect on the world economy is at the centre of economic debate. In the advanced countries the main concern is that, by investing abroad, firms may relocate offshore some stages of production previously realized at home. If such activities are not replaced by other home production, foreign direct investment (FDI) will lead to an impoverishment of the domestic economy. Some politicians regard this as a threat and some are even prepared to introduce subsidies in order to stop firms delocalizing.[2]

The aim of this paper is to verify whether firms' domestic and foreign activities are mainly substitutes or complements. We follow two different approaches. First, we assess the effect of investing abroad on a sample of Italian manufacturing firms that have started to produce goods and services abroad (switching). Since switching firms and domestic firms are heterogeneous enterprises, contrasting the former with the latter can produce biased results because of the typical self-selection issue. We tackle this problem by using an identification strategy based on key qualitative information provided by our data set. Namely, we know which firms had considered the possibility of investing abroad but had not yet done so. According to a large set of variables, these domestic "near-investing" firms turn out to be similar to the switching ones. To reduce further the heterogeneity across enterprises, we compare switching enterprises with only the closest "near-investing" firms in terms of several observables. We then use difference-in-difference (DID) estimates to control for time-invariant differences in unobservables between the two groups.

This methodology has two main limitations. First, the identification strategy relies crucially on the assumption that switching firms and their control group differ only as to switching, i.e. conditional on observables, internationalization is assumed to be random across the two groups. This is a strong hypothesis, which, unfortunately, is not directly testable. Second, the identifying assumption is more likely to hold over a short time-window. With a

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[2] See e.g. the article "Not so exceptional. French industry is taking on more Anglo-Saxon characteristics" in *The Economist* (28th March 2008).

long time-window many other things are likely to happen and confound the effect of internationalization. Thus, the method is less reliable over the medium-to-long term.

Being aware of that, we supplement the analysis with a complementary econometric strategy. Using a sample of multinational enterprises only, we explore the conditional correlation between domestic and foreign employment over a longer period. In order to take account of the intensity of internationalization, we also contrast multinationals that increased foreign employment with those that did not.

The impact of the internationalization on domestic production may depend strongly on the motives for FDI. Therefore, in both models we consider the reasons for investment and we separate market-seeking (horizontal) from factor-seeking (vertical) FDI. In the second model we can also identify firms that pursue "complex" strategies of internationalization, which are a combination of the previous ones.

Overall, our results suggest that domestic and foreign activities are more likely to be complements than substitutes. In the first model, the less favorable estimates show that sales and productivity decrease two years after the investment but only for firms that have undertaken horizontal FDI. On the other hand, there are no significant effects on employment and on the skills composition of the workforce. With the second model, over a longer time span we found a positive relationship between domestic and foreign employment, in particular for the higher-skilled workforce and for firms that adopted complex internationalization strategies.

This paper is related to an established literature that studies the impact of international activity, especially exports, on firms' performance; it includes, among others, Bernard and Jensen (1999), Wagner (2002), Girma et al. (2004), De Loecker (2007) (see for a review: Greenaway and Kneller, 2007). The literature that investigates the effects of FDI applying matching methodologies is scant. Barba Navaretti et al. (2010) analyze the impact of investing abroad for a sample of Italian and French firms using the propensity score-matching method and DID estimates. They find a positive impact on productivity, output, and employment for investment by Italian firms in developed countries, from one to three years after the investment, which is attenuated in the case of investment in developing countries. Hijizen et al. (2006) carry out a similar analysis on French firms. They observe that market-seeking investment has a positive impact on employment and productivity, while for factor-seeking investment the initial negative impact is compensated by a recovery two years after. In the case of Germany, Becker and Muendler (2008) show how in the multinational enterprises that expand abroad the employment, the domestic worker separation rate is significantly lower than

in the matched non-expanding multinationals. Further evidence on Italian firms is provided by Castellani et al. (2008), who estimate a dynamic panel data model. They find that the level of employment of parent companies does not change after the investment, but the composition of the workforce does: more specifically they observe a skill upgrading of the workforce for firms that invest in Central and Eastern European countries. As regards our second model, the related literature includes Blomström et al. (1997), Brainard and Riker (1997a,b), Braconier and Ekholm (2000) and Harrison and McMillan (2007). In this paper we follow closely the methodology of Blomström and co-authors, who study the dynamics of domestic and foreign employment of a sample of US and Swedish multinational firms.

This paper adds to the existing literature in three respects. First, our data set provides crucial information for the identification strategy; specifically, we know which firms had considered the possibility of investing off-shore but had not yet done so. In addition, a large set of quantitative variables, including exports and employment by skills, is also accessible. Such a wealth of information allows us to construct accurate control groups. Second, we address the issue with an additional econometric strategy. This supplementary model sheds light on the evolution of the domestic and foreign activity of a sample of multinationals over a longer period (6 years). Third, we attempt to verify whether the impact of internationalization changes according to different types of FDI, namely vertical, horizontal or complex.

The paper is structured as follows. In the next section we discuss the theoretical background. Sections 3 and 4 then focus on the first empirical strategy, and Section 5 on the second econometric model. Section 6 concludes.

2. Background

The traditional theory of foreign direct investment (FDI) distinguishes between horizontal and vertical FDI (see e.g. Markusen, 2002). *Horizontal* FDI occurs when firms produce similar goods or services in multiple countries to overcome trade barriers, reduce transport costs or because they benefit from being close to the final customers. In *vertical* FDI firms fragment the production process into stages to take advantage of differences in input prices; thus, activities are located across countries according to the relative endowment of inputs. It is argued that domestic and foreign productions are substitutes in the case of horizontal foreign investment, in that multinationals produce and sell directly in the final markets, and complements in the case of vertical FDI, because the activities located in different countries represent stages of the same production process (Markusen and Maskus, 2001;

Markusen, 2002). This theory can only partially help us to predict what happens in the case of firms that switch from domestic to multinational, i.e. those that invest abroad for the first time.

Firstly, the rigid separation between vertical and horizontal FDI is mainly theoretical. On the empirical level, it has been observed that the majority of FDI cannot be classified into just one of the two categories. In this regard, UNCTAD (1998) coined the term "complex integration strategies" to illustrate how firms find new forms of internationalization that are outside the vertical-horizontal paradigm. Firms may break down the production process into different stages and divide these stages into different countries, combining market-seeking (horizontal FDI) with factor-seeking strategies (vertical FDI). They may also produce goods in cheap labor countries in order to benefit from the low input costs and sell the output in third markets, creating "export-platforms". Complex strategies are also documented by Feinberg and Keane (2006) who found that only 12 per cent of the US multinationals with affiliates in Canada could be classified as purely horizontal and only 19 per cent as purely vertical. This empirical evidence has also motivated theoretical analyses. One of the first contributions is Yeaple (2003), who shows how firms in advanced countries can undertake complex strategies by investing in other advanced countries to reduce transport costs and in the less developed countries to take advantage of input price differentials. The equilibrium strategy depends on the combination of transport costs, fixed costs of investing abroad, and factor price differentials. As a result, in his model, foreign and domestic production can be either complements or substitutes. In a related model by Ekholm et al. (2007) export-platform strategies can arise also in equilibrium. Grossman et al. (2006) develop this framework by introducing firms' heterogeneity in the presence of sunk costs. They assume that each type of internationalization, such as exporting or FDI, is associated with a different level of sunk costs; the highest ones are those relating to FDI. The authors show that the type of internationalization undertaken is correlated with firms' productivity and that export-platform strategies are mainly chosen by the more productive ones.

Furthermore, even in the case of pure vertical or horizontal strategies the effect of internationalization on switching firms is hardly predictable. For example, if we look at domestic activity as measured by sales or employment, the expected effect of switching is ambiguous. Domestic production may decrease if firms move part of the production process previously produced at home, both in vertical and horizontal FDI. But it could also increase if firms are expanding their production abroad or if there are some complementarities between domestic and affiliates' production lines; e.g. parent firms may supply certain types of services or inputs, such as management or marketing, to subsidiaries. A positive relationship can also

occur when, thanks to the investment abroad, firms are more competitive and gain market shares.

To invest abroad might also have structural effects on the home workforce's skill-intensity. If firms displace the less skill-intensive production stages we will see a skill upgrading of the workforce after the investment. This is not the only possible effect, though. Firms could also move the more skilled stages of production; for example some firms could locate R&D activities in the advanced countries where skilled workers are abundant, while others might transfer managers or supervisors abroad to guide subsidiaries.

For productivity, the expectation on the impact is also ambiguous. We envisage that by relocating or acquiring some activities a firm should improve its productivity: firms may obtain efficiency gains by taking advantage of increasing returns to scale, rationalizing the division of labor across countries, or saving on input prices. However, the positive effect is likely to occur in the long term, while the short-run impact can be negative if there are adjustment costs or frictions in the new firm's international organization of labor.

Summarizing, theory is unable to predict precisely the impact of investing abroad on the level of domestic activity. The outcome depends not only on the type of investment, but also on a number of other circumstances that are often case specific to each investment.

3. Empirical strategy and data

Our first goal is to evaluate the causal effect of investing abroad (switch) on the firm's domestic activities. For this purpose, ideally we want to observe the same firm in two different settings, one where it becomes multinational and another where it remains domestic. Formally, let y_{it} be our outcome variable of firm i at time t, and $SWITCH_{it}=\{1,0\}$ an indicator if the firm i switches from domestic to multinational at time t. The causal effect of switching on the variable y at time $t+s$ is defined as: $(y^1_{it+s}-y^0_{it+s})$, where y^1_{it+s} is the value of the variable y of the switching firm i after the investment and y^0_{it+s} the value of the same variable in the same period if the firm i had not switched. The problem is that y^0_{it+s} is unobservable for the firms that have switched. To overcome this issue we follow the traditional approach of the program evaluation literature (e.g. see Angrist and Kruger, 1999; Heckman et al., 1997). We define the average impact of switching on the variable y at time t+s as:

$$E\{y^1_{it+s}-y^0_{it+s}|SWITCH_{it}=1\}= E\{y^1_{it+s}|SWITCH_{it}=1\}- E\{y^0_{it+s}|SWITCH_{it}=1\} \quad (1)$$

and since y^0_{it+s} is unobservable, we try to construct a valid counterfactual for the last term of the equation (1) by choosing a control group of firms that had not switched. Finally, the impact is estimated by substituting the last term of equation (1) with $E\{y^0_{it+s}|SWITCH_{it}=0\}$, the average of the outcome variable for a sample of firms that did not switch.

The challenge of this strategy is the construction of a valid control group. Ideally, controls should differ from switching firms only for not having switched. In our case the task is particularly challenging because the choice of investing abroad is endogenous and self-selection bias is likely to occur. For example, it is known that multinationals are larger, more productive, and with higher export propensity and R&D outlays than domestic firms (see e.g. Markusen, 1995; Helpman et al., 2004). Hence, merely comparing the performance of the two groups could lead to biased results because of the self-selection and endogeneity issues.

We attempt to remove the self-selection bias in several ways. First, we rely on the strategic information provided by our data set. More specifically, we can identify the firms that had considered the possibility of investing abroad but had not yet done so. These "near-investing" firms are more likely to mimic the behavior of switching firms. The closeness of the two groups, documented later, encourages our identification scheme. Second, we match switching and near-investing firms that belong to the same 2-digit sector and that are as similar as possible to each other according to several observables, in levels and trends, before the investment.[3] Then, we run difference-in-differences estimates. With DID the impact of the investment abroad is estimated by the change in the difference between switching and control group before and after the investment. Formally, $DID=[E(y^1_{it^*+s})-E(y^0_{it^*+s})]-[E(y^1_{it^*-s})-E(y^0_{it^*-s})]$, where t^* is the year of the first foreign investment. The advantage of the DID estimates is that they allow for time-invariant differences in observables and also in non-observables between switching and domestic firms (Blundell and Costa-Dias, 2000; Smith and Todd, 2005a). Finally, we collect evidence from different control groups and econometric models for the purpose of robustness checks.

The econometric model for the DID estimates is the following:

[3] We use one-on-one matching method. In order to choose the domestic firms belonging to control groups we rely on a variant of the Mahalanobis metric (Rosenbaum and Rubin, 1985) given by the following distance function $= \left| \sum_k \sum_j \omega_k (X_{ki} - X_{kj}) \right|$; where i=switching firms, j=domestic firms (of the same 2-digit sector); X=is the set of the main observables in logarithm (employment, sales, exports) together with the annual change in sales and employment; ω_k= weight assigned to observable k. We did not adopt the more popular propensity score method of matching (Rosenbaum and Rubin, 1983) because the limited sample size hampered the estimation of the p-score by sector. We tried to estimate the propensity score over the whole sample and then matching switching with domestic firms with the nearest value of p-score within the same industry. However, since firms were paired within the same sector after the estimate of the p-score, the balancing properties after the matching were not satisfying.

$$y_{it} = \alpha_t + \alpha_r + \alpha_p + \beta_1(Post_{i\tau}) + \beta_2(SWITCH_i) + \gamma(Post_{i\tau} * SWITCH_i) + \varepsilon_{it} \quad (2)$$

where, α_t, α_r, α_p are full sets of fixed effects at the level of year, region of localization of the firms, pairs of firms (each treated and its control), respectively; $SWITCH_i$=1 for switching firms and 0 for the controls; let t_i* be the switching year of firm i and τ_i a time indicator equal to 0 in the year of the investment abroad, we then define Post=1 if either $\tau_i = t_i^* + 1$ or $\tau_i = t_i^* + 2$ and *Post=0* if $\tau_i = t_i^* - 1$; ε_{it} is the error term with the usual characteristics. Our outcome variable y is the log of employment, sales, skill-intensity and labor productivity –all referring to domestic activity. γ is the parameter of interest: it measures the change in the difference of the outcome variable between switching and controls after the investment; it is our estimate of the effect of switching on domestic activity.

The DID estimator is implicitly based on the common trend assumption: the validity of the inference is undermined if the two groups show different trends in the outcome variables before the treatment (Blundell and Costa Dias, 2000; Blundell et al., 2004). Therefore, we carefully check that in the pre-investment period the growth rates of the main outcome variables did not differ substantially between the two groups.

Another implicit assumption of this methodology is that investing abroad must not have an impact on the activity of domestic firms. If the control group is indirectly affected by the investment abroad – e.g. because, thanks to efficiency gains, switching firms subtract market shares from competing domestic ones – the evaluation will be biased. Unfortunately, there is not a formal way to test this hypothesis. We can only assume that it holds in the short term. This should not appear too restrictive if we believe that off-shore investment actually can have an impact on domestic market, but that the effects occur only gradually over time. Therefore, it is likely that the bias arises only over the medium-long term.

3.1 Data

Data are drawn from the Bank of Italy Survey of Industrial and Service Firms, which has been conducted annually since the early ’80s on a representative sample of Italian firms. The survey collects several quantitative information, including firms’ sales, exports, investment, number of employees (of which, blue-collar workers), profits, start year, research and development expenditure, and wages. In this paper only manufacturing firms are

considered. Data are collected directly by regional branches of the Bank of Italy; their involvement assures a high participation rate (78 per cent) and good data quality. For more information on the survey, including the questionnaire, see Bank of Italy (2006).

In 2004 the Bank of Italy asked the firms with at least 50 employees information on their international activity. We use the 2004 year of the survey, in combination with the other waves from 1984 to 2006, to collect data on firms that started to produce goods or services abroad during this period (*switching firms*), on firms that had considered the possibility of investing abroad but had not yet done so (*near-investing firms*) and on the other firms that did not produce abroad (*other domestic firms*). From the last two groups we select the control groups for switching firms.

The samples of switching and control groups are balanced over a period of four years, starting two years before the investment and ending one year after. We also present the results of the model estimated up to two years after the investment on the sub-sample of firms for which data are available. We are aware that longer time spans would have provided a wider and probably a more interesting picture. However, there are two main obstacles to stretching the period: sample size would have been reduced, because firms are not always present in the survey and, more importantly, the reliability of our evaluation exercise would have been considerably weakened because the identifying assumptions are less likely to hold for a longer time period when many other things can occur to confound the effect of switching.[4]

In Table 1 we describe our samples. In the 2004 survey there are 1,668 manufacturing firms with at least 50 employees.[5] Of these 270 are *multinationals* (they currently produce

[4] We illustrate our strategy to construct the group of switching firms and its controls as follows. 1) We asked the firms if they produce goods or services abroad or if they had considered the possibility of carrying out part of the productive activity abroad in 2003-04: we denoted as *domestic firms* those with negative answers. 2) We asked the firms giving positive answers whether they currently produced goods or services abroad and when they started their foreign activity: we called the firms with positive answers *multinationals,* and those with negative answers *"near-investing" domestic firms*, because they had considered the possibility of investing but had not yet done so. 3) Finally, we denote as *switching* firms the multinationals that started to produce abroad in the interval 1984-2004 and that were observed continuously from two years before to one year after the foreign investment.
In the paper we match *switching* firms with control groups of firms drawn from *domestic* and *near-investing* firm samples. Notice that the control groups might also include firms that did not produced offshore in 2004 but that had produced abroad sometime in the past. Even if we cannot exclude the possibility that these firms are included in the control groups, we can estimate the probability that in our sample MNEs completely stopped producing abroad. Using the 2006 wave of the survey we find that out of 154 firms that had offshore activity in 2000, only 8 have no more foreign employment in 2006 (5.2 per cent; the interval 2000-06 is the time span for which data are available). By applying this percentage to our samples we can conclude that about 3-4 firms of our control group might be affected by this bias. (Of course, the percentage might increase for a longer time period, however, in our sample more than 70% of the firms switched in a time windows of 7 years). Thus, according to this evaluation and taking into account that we use more than one control group, we believe that the event of opposite switchers (from multinationals to completely domestic) has a low probability and can have only a marginal impact on our results.

[5] Notice that the 5 largest firms (more than 8,000 employees) have been excluded because of the difficulty of finding an appropriate matching.

goods or services abroad), about 16 per cent, of which the sub-sample of *switching* firms totals 89. Among the remaining firms that did not invest abroad, 280 are *near investing* and 1,118 are the other *domestic firms*. The table confirms the well-known characteristics of multinationals: they are larger, with higher export propensity, more productive, older, pay a higher wage, employ more skilled workers and invest more in R&D activity than domestic firms. According to our samples, investment-employee ratio and profits are instead smaller. Switching firms do not on average differ noticeably from multinationals, although it is worth mentioning the higher wages and human capital, together with lower productivity, in the former with respect to the latter.

Among the domestic firms, the "near-investing" ones are evidently closer to the switching firms than to the other domestic firms. The similarity is stronger with switching firms that become multinationals in the period 2003-04, the same period in which the "near-investing" enterprises have thought of investing abroad (see columns 5 and 6 of Table 1). The Table also reports the standard errors for the sample means. For switching firms, investment and exports record the largest values among the main variables: about 22 and 20 per cent of the mean, respectively. For this reason we preferred not to consider such variables as outcomes.

Table 2 illustrates the distribution of switching firms by year of the first foreign investment, sector and region of localization. In our sample the majority of the firms switched between 1998 and 2004 (about 70 per cent).[6] The sectors most often represented are those in which Italian industry specializes: machinery and equipment (with electrical machinery) and some traditional sectors (such as leather products, other manufacturing industries and textiles and clothing). As regards the region of localization, as expected, the number of switching firms is larger in the North (in particular in Piedmont, Lombardy, Emilia Romagna, Friuli Venezia-Giulia and Veneto) than in the Centre and South (with some exceptions, such as Le Marche and Puglia).

4. Results

We start by matching switching firms with the sample of "other domestic firms" (*Matching #1*). We use the method of matching on covariates described before to construct the control group for the switching firms. Since the matching is carried out by sector and over the

[6] This concentration of switching firms over time is due to the fact that information on FDI was gathered in 2004 and there is some attrition in the data.

same time span, for a few firms it was impossible to find an appropriate match, these firms are dropped from the analysis.[7]

The means of several observables and their time changes for the two groups just before switching are reported in the Appendix (Table A1). In order to measure the similarity between the two groups, we report the differences in means and the standardized difference (SDIFF) of several variables between the two groups.[8] Given that there is no formal criterion for defining a critical value of SDIFF, we follow the standard practice of considering large a value of 20 per cent (Rosenbaum and Rubin, 1985; Smith and Todd, 2005b).

Overall the two samples are rather similar. Differences in means are not statistically significant and for all the observables in levels SDIFF are below 10 per cent, except in the case of investment and profits. Differences in growth rates are larger but still within reasonable boundaries for all the variables.

In *Matching #2* we compare the switching firms with a control group of matched firms drawn from those that had thought of investing abroad but had not yet done so (near-investing). The balancing properties are shown in Table A2 in the Appendix. The means of the two samples are very close, especially for variables in levels, and the differences are never statistically significant. SDIFF are much smaller than the worrying threshold of 20 per cent. By comparing the balancing properties of the two matching samples, we notice that the control group drawn from the near investing firms (matching #2) turns out to be closer to switching firms than to the control group drawn from the other domestic firms (matching #1). In the former the mean of the standardized differences, in absolute value, is 6 per cent lower than the same mean calculated over the latter; 13 per cent lower if we do not include in the computation the difference in the firms' start year, which is presumably only marginally correlated with firm performance. The greater ability to mimic the observables of switching firms confirms our a priori that near-investing firms are a more appropriate set from which to draw an accurate control group for switching enterprises. We regard this group as our preferred match, although for illustrative purposes we present results for both.

Figures 1 and 2 show the unconditional means of the outcome variables for switching firms and their controls, from 2 years before internationalization to 2 years after. Notice that

[7] From 89 switching firms, we end up with 85 firms in matching # 1 and 82 in matching # 2. Notice that the 82 switching firms belonging to the second control group are different from the 85 switching firms in the first control group.

[8] The SDIFF of the variable y is given by the difference in means between switching and matched controls divided by the square root of the average variances of the variable y in the two groups. Formally:
$SDIFF(y)=100(1/N)[\Sigma_i(y_i)- \Sigma_j(y_j)]/[Var(y_i)+Var(y_j)/2]^{1/2}$, where i denotes switching firms and j firms in the control group.

because of the availability of data at t*+2 the sample of matching #1 is reduced by 10 pairs of firms and that of matching #2 by 14 pairs. Apparently, from the pictures it seems that there is no significant impact of FDI over the short period. DID estimates of parameter γ for different models are reported in Table 3. The model is estimated with and without region, time and pairs dummies. The pre-switching time period taken as reference for the DID estimates is one year before the first investment abroad (t*-1). We will discuss mainly the results of the second (preferred) matching.[9]

The result of the estimates confirm the first impression. One year after the investment, the changes in the employment, sales, skill intensity and productivity of switching firms are very close to those of the control group, both in economic and statistical terms. After two years, the differences in absolute value increase slightly, although they remain quite low and statistically non-significant (to 1.0 per cent for employment, -5.9 for sales, -0.7 for skill intensity and -6.9 for productivity). Notice that the model estimated including fixed effects produces almost identical results and that if the model is estimated with the lagged dependent variable (at t*-2) as regressor the results are unchanged (they are not shown but are available upon request). This almost imperceptible difference confirms the validity of our control group.

A somewhat different picture emerges from the estimates based on matching #1: in this case the results are more positive for switching firms. This difference suggest that the selection bias might not have been removed completely from this control group.

The overall dynamic could mask substantial heterogeneity effects across firms. It is possible, in fact, that the effect differs along with the type of investment and that without differentiation the outcomes may be blurred. In particular, firms might experience different dynamics with different motives for internationalization. For example, for firms that carry out vertical investment to reduce labor costs, domestic activity might be stimulated by the investment, since in this case home production can complement production performed offshore. In the case of horizontal investment the opposite may occur, since a share of the production process initially carried out at home is delocalized. Distinguishing vertical from horizontal FDI in the data is a hard task, however. In the literature some authors differentiate vertical from horizontal FDI according to the country of destination of the investment (e.g. Barba Navaretti et al., 2010), others to the sector of the internationalizing firm. Neither method is problem-free. For example, developing countries can attract both horizontal and vertical investment as they offer cheap workforce and also represent expanding markets, e.g. China and

[9] In the estimates we do not use sample weights.

India. A similar criticism applies to the approach based on sector, distinguishing traditional industries from the others. A more promising method, which unfortunately we are not able to follow owing to data constraints, is that of Harrison and McMillan (2007), who use the amount of trade flows between parents and foreign subsidiaries. In the light of these considerations we adopt a different approach. We distinguish the type of firms' investment according to the change in the vertical integration of the productive process after the investment. We define as vertical firms that record a fall of more than 5 per cent in the value added/sales ratio after the investment and as horizontal the others (different thresholds change the results only marginally). A non-marginal drop in the ratio suggests that the firms have delocalized abroad part of the productive process previously carried out internally. We are aware that this method is also questionable. For example, we may include among vertical FDI firms that have undertaken outsourcing strategy in the home country at the same time as investing abroad. Moreover, complex strategies might be at play in both types of investment, although we tend to think that they fall in the vertical category if the delocalization of the productive process is sufficiently large. Even with these caveats in mind, we believe the exercise sheds further light on the effects of internationalization. Since data on value added of switching firms are not available in the Bank of Italy' survey; we have collected them from the balance-sheet data set provided by the Company Accounts Data Service - CERVED.[10]

The DID estimates by type of investment are obtained by interacting the dummy for switching with two dummies for each type of FDI (*vertical* and *horizontal*) and running the following regression:

$$y_{it} = \alpha_t + \alpha_r + \alpha_p + \delta_1(Post_{i\tau}) + \delta_2(SWITCH_i*Vertical_i) + \delta_3(SWITCH_i*Horizontal_i) \\ \gamma_1(Post_{i\tau}*SWITCH_i*Vertical_i) + \gamma_2(Post_{i\tau}*SWITCH_i*Horizontal_i) + \eta_{it} \qquad (3)$$

the results for the parameters of interest, γ_1 and γ_2, are reported in Table 4. [11]

In line with the theoretical indications, in our preferred matching the results show that in vertical FDI (potentially including complex FDI) domestic and foreign activity are more complementary than in the horizontal FDI. More in detail, as regards vertical FDI, the impact of investment abroad on employment, sales, skill intensity and productivity turns out to be statistically non-significant and very close to zero: after two years the DID coefficients are, respectively, 3.7, 1.1, -0.8 and -2.6 per cent in the model without fixed effects (close values

[10] The Company Account Data Service - CERVED provides balance-sheet data for almost all Italian corporations.
[11] In matching #1 (matching #2) there are 39 (37) vertical and 46 (45) horizontal firms.

emerge from the model with fixed effect). On the other hands, for horizontal FDI the scenario is rather different. The investment seems to induce a negative effect on domestic activity: for example, two years after the investment employment, sales and productivity are 0.9, 11.2 and 10.2 per cent lower than in the control group, and the last two coefficients are also statistically significant. However, as regards skill intensity, we observe no significant changes in its composition. The drop in productivity might be explained by the initial increase in direct and indirect costs to coordinate the foreign activity of subsidiaries. Again, with the alternative matching the results are more optimistic: the coefficients are (almost) ever positive and in the vertical FDI they are also statistically significant for employment and sales.

4.1 Robustness checks

One potential weakness of our analysis derives from the survivorship bias. If the probability to survive for switching firms decreases after internationalization, e.g. because investing abroad is risky and a share of switching firms dies as a consequence of unsuccessful investment, DID estimates are upward biased (of course, bias arises only if the probability of failing for switching firms is larger than the probability of failing if the firm remains domestic). Another source of bias comes from the possibility that firms move the whole production process to another country and are no longer observables in our data set.

We address the attrition issue in the following way. We assume that the survivorship rate does not substantially change immediately after the investment but only over a longer time-span. We consider this a reasonable assumption. If a firm makes the wrong investment it should still have the resources to survive for some years after switching. This is even more likely for our sample, which includes large switching firms. Similarly, in the event that firms move the whole production process away, it is reasonable to assume that the cessation of domestic activity will occur after some years after the first investment. This because the first off-shore investment is riskier and enterprises will probably decide to close home activities only after it has proved successful.

In the light of these considerations, we tackle attrition by restricting the analysis to firms that switched in a period close to 2004, the year of the survey. In particular, we focus on those that invested from 1999 onwards. The timing of the restriction is arbitrary; however, changing the starting year has no significant impact on the results.

The comparison of the switching and the control group is shown in Table A3 in the appendix. The balancing properties do not seem very satisfactory in the first matching, while they are substantially better in the second. The DID estimate results are reported in panel A of Table A4. We notice that for all the outcome variables the results tend to confirm those obtained with the previous exercises. The sign of the parameters is almost always confirmed and again for all the variables the DID coefficients are not statistically significant. From these findings it seems that attrition can bias our results only marginally.

A second concern relates to the possibility that our findings depend crucially on outliers. Therefore, as robustness check we exclude the 1st and the 99th percentile of the distribution of the time change of each outcome variable. Results are reported in panel B of Table A4. The exercise is reported for the period t*+2 for the sake of synthesis, but similar results are obtained at t*+1 (they are not shown but are available upon request). Also this exercise substantially confirms the previous findings.

5. Further evidence from a different empirical strategy

In this section we present further evidence from a complementary econometric strategy. For a sample of multinational manufacturing firms with at least 20 employees, we estimate the conditional correlation between domestic and foreign employment (employees in the foreign subsidiaries) over the period 2000-06. This exercise has several advantages. First, unlike the previous model only firms that have produced goods or services abroad during this period are examined (i.e. only MNEs); therefore, firms' heterogeneity is attenuated. Second, we are able to study the dynamics of domestic and foreign activity over a longer time span (6 years). Third, the answers of the firms allow a more precise classification of FDI, given that we are also able to classify complex FDI.

There is an established literature studying the degree of substitution between domestic and foreign activity at firm level. As regards employment, Blomström et al. (1997) regress the employment of US and Swedish parent firms on sales of foreign affiliates, controlling for the level of domestic output. They conclude that foreign sales are negatively correlated with domestic employment for US firms, while the opposite occurs for Swedish multinationals. A different group of studies has estimated labor demand equations testing cross-country wage elasticity to assess the degree of substitution of labor employed abroad and at home. For example, Brainard and Riker (1997a,b) focus on US multinationals and find that labor is

complementary if affiliates are located in similar countries for factor endowments, and substitutive if subsidiaries are in different countries. Braconier and Ekholm (2000) follow a similar approach focusing on Swedish multinationals. They find evidence of substitution when affiliates are located in high-income countries, but no evidence of substitution when affiliates are in low-income countries. Harrison and McMillan (2007) study further the impact of changes in foreign affiliate wages on US firms' employment, distinguishing between horizontal FDI and vertical FDI. Their paper shows that in horizontal FDI domestic and foreign employment tend to be substitutive, and the opposite occurs in vertical FDI.

Because we do not know firms' wages in the off-shore activities we are unable to estimate cross-country wage elasticities and therefore we follow an approach closer to that of Blomström et al. (1997).

In the 2006 survey, 210 firms reported having produced outputs abroad in the period 2000-06; 101 of these were interviewed in 2000. This sub-sample of firms is the object of our analysis.[12] We explore the dynamics of domestic employment assuming it to be a function of the level of domestic and foreign activity:

$$\log(E)_{it} = \alpha_i + \alpha_t + \beta_1 \log(\textit{Domestic Sales})_{it} + \beta_2 \log(\textit{Domestic Sales})^2_{it} + \beta_3 \log(\textit{Foreign Employment})_{it} + \Sigma_s \delta_s \textit{Trend}_s + \Sigma_r \delta_r \textit{Trend}_r + \varepsilon_{it} \quad (4)$$

where E_{it} is the domestic employment of firm i at time t. We include a full set of firm specific and year fixed effects to control for firms' heterogeneity and common time shocks. We also include sectoral and regional specific trends to allow for the dynamics of labor markets that influence labor demand by sector, such as changes in industrial relationships or sector specific business fluctuations, and differences in regional economic growth. As a proxy for domestic activity we use sales and sales squared to take account of possible non-linearity; for the level of foreign activity we use employment in foreign affiliates. [13]

In order to control for individual fixed effects we take time differences from 2000 and 2006 of model (4) and estimate the following equation:

$$\Delta\log(E)_{it} = \alpha + \beta_1 \Delta\log(\textit{Domestic Activity})_{it} + \beta_2 \Delta\log(\textit{Domestic Activity})^2_{it} + \beta_3 \Delta\log(\textit{Foreign Activity})_{it} + \delta_s + \delta_r + \eta_{it} \quad (5)$$

[12] Notice only a very small number of these firms are included in the sample of the previous exercise.
[13] Sales are at current prices. For homogeneity we do not deflate domestic sales because we are not able to deflate foreign sales. However, using domestic sales at constant prices changes the results only marginally.

where $\Delta y = y_{2006} - y_{2000}$.

The results of the regressions are presented in Table 5; β_3 is our coefficient of interest which estimates the conditional correlation between home and foreign employment. The fit of the model is rather good. One third of the variance of domestic employment is explained by the model without fixed effects and almost half with regional and sectoral fixed effects. We notice that with OLS estimates the coefficient of foreign employment is always positive. According to the estimation a 1 per cent increase in foreign employment is correlated with an increase of about 0.02 per cent in total domestic employment. This coefficient is relatively stable across the model specifications but turns out to be non-statistically significant at the standard confidence intervals.

Our model is not based on a specific theory; rather it investigates the partial correlation between domestic and foreign employment. It is also possible that changes in domestic employment induce changes in foreign employment. In that case foreign employment could be correlated with the error term and the estimation of the correspondent coefficient could be biased. We deal with the potential endogeneity problem through instrumental (IV) method and 2SLS estimates. We use the level of foreign employment in year 2000 as instrument for the changes in foreign employment. In column 4 we report the results of the IV estimation. The result of the F-test in the first stage is rather high (F=35.8). The coefficient of foreign employment is still positive but larger than the previous estimates (0.038). However, it remains statistically non-significant at the standard level.

In columns 5- 12 we show the estimates using the changes in either white or blue-collar domestic employment as dependent variable. White collars are managers or employees and blue collars are workers. According to our results, the conditional correlation between the changes in domestic and foreign activity is considerably larger for white collars than for blue collars. In the complete model, the coefficient for white collars is about three times that for blue collars: 3.6 per cent (6.0 per cent if estimated by IV) and 1.1 per cent (2.2 per cent if estimated by IV), respectively. Only for white collars the parameters turns out to be statistically significant. These results do not depend on outliers. The results shown in the last three columns of Table 5, where we have excluded the 1st and 99th percentile of the distributions of the dependent variables, are almost identical.

We provide additional evidence that domestic and foreign employment are mostly complements and that the employment of high-skilled workforce is correlated more than average with off-shore employment. It is interesting now to estimate the correlations by

different types of FDI. Compared with the previous model, the method of classifying firms according to the different kinds of FDI is more accurate here, as we have collected information on the main reason for the investment abroad directly from the firms. Thus, we are able to classify firms that have invested off-shore for the following non-mutually exclusive reasons: lower labor costs, proximity to final markets, other motivations (e.g. tax incentives, regulation, etc). Firms that assessed either labor costs or proximity to final markets as being important or very important are classified as pure *vertical* or *horizontal*, respectively. Firms that considered both these reasons important (or very important) are classified as *complex* and the remaining firms as *other*.[14] Table 6 gives the results of the model (5) estimated by interacting foreign employment with four dummies, one for each type of FDI. Overall, all the coefficients are positive. The correlation turns out to be larger in the case of complex investment and other types of investment than for pure vertical or horizontal FDI; the coefficients are not statistically significant, though. The results tend to confirm those obtained in the previous models (equation 3), where we found that the effect of switching was more positive for vertical-complex FDI. By distinguishing the impact on domestic white and blue collar employment the results become more clear-cut. The correlation between domestic white-collars and foreign employment in the case of complex FDI is equal to 6.8 per cent and statistically significant (robust standard error=0.034); on the other hand, blue-collar employment turns out to be only marginally correlated with foreign employment (the largest coefficient estimated is equal to 1.7 per cent).

The counterfactual analysis carried out in the previous section might be plagued if we were unable to control successfully for the heterogeneity between multinationals and domestic firms. In this regard, information on the level of foreign and domestic activity gathered in 2006 turns out to be important for indirectly checking for the robustness of our previous results. We proceed as follows. By using the 2006 release of the survey we focus only on multinational firms (MNEs), those with positive foreign employment in 2006. We then estimate the effect of foreign expansion, rather than of switching as in previous counterfactual model, by comparing the expanding MNEs with non-expanding MNEs. We use two methods to identify expanding MNEs. First, expanding firms are those that experienced a growth in foreign employment between 2000 and 2006; second, expanding firms are those that show larger changes in foreign employment than the median. The aim is to compare the performance of firms that are more

[14] The other possible answers were: unimportant; of little importance; not applicable. The firms' distribution by FDI category is the following: 24 per cent made vertical FDI, 38 per cent horizontal, 26 per cent complex and 13 per cent others.

homogenous (all are MNEs) before and after the increase in foreign exposure.[15] From the 101 MNEs we collect 74 expanding firms (51 with the second threshold) and 24 non-expanding firms (47 with the second threshold). The three largest firms, with more than 8000 employees, are excluded to reduce differences between the groups. The mean differences of domestic employment, sales and exports between the two groups are not statistically significant (first three columns of Table 7). The last two columns of Table 7 contain the estimates of the coefficient γ of the following model:

$$\log(E)_{it} = \alpha_1 + \beta_1(Post)_t + \beta_2(Expand)_i + \gamma(Expand*Post)_{it} + \delta_s + \delta_r + \phi_{it} \quad (6)$$

where t=2000, 2006; *Post*=1 in 2006 and 0 in 2000; *Expand* is a dummy variable denoting expanding firms; δ_s and δ_r are sectoral and regional fixed effects. DID estimates tend to confirm those previously obtained: The coefficient γ turns out to be positive and statistically significant; it is smaller when we use the median as threshold. These findings are consistent with those obtained by Becker and Muendler (2008) for German firms.

5.1 Extension: Results by domestic geographical area

We extended the analysis further to verify whether there are heterogeneous results across firms localized in different areas of the country. This exercise is motivated by the fact that in Italy local economic differences run deep; advanced areas (especially the North West) contain the majority of internationalized firms, while the number of multinationals is very small in the South. However, in recent years Italian firms have been internationalizing production at a very rapid pace, especially firms localized in the regions of the North-East (NE), a highly industrialized area with a large number of small and medium enterprises. According to the Reprint-Polytechnic of Milan database, the number of the foreign firms participated by Italian firms localized in the north-eastern regions has increased by over 550 units between 2001 and 2006.

The exercise is carried out on both the models. In the counterfactual analysis we estimate equation (2) where the dummy (*Switch*Post*) is interacted with two other dummies: one that identifies the firms localized in the North-East and another those in the Centre and

[15] Becker and Muendler (2008) follow a similar approach. Notice that in our sample switching firms form a sub-sample of expanding firms. Results shown later are substantially unchanged if we exclude switching firms from the analysis.

South. Therefore, we estimate two additional parameters that measure the differential impact of internationalization for north-eastern and central and southern firms with respect to those in the North-West. The results are reported in Table A5 of the appendix. For the North-East the impact seems rather similar to the North-West: the parameters are almost never significantly different between the two areas. Some differences arise for the firms in the Centre and South: the impact of employment is sometimes significantly larger, while the skill composition is smaller. For the other outcome variables we do not observe any significant differential effects.

We analyze the differential impact by area also through the second model: we interacted the geographical areas dummies with the foreign employment variable in equation (5). The results are shown in Table A6. In this case we find that firms in the North-East have significantly lower correlations between domestic and foreign employment than those in the North-West, especially for white-collar employment, while there are no differences with central and southern firms. We argue that the results for north-eastern firms are due to the fact that these enterprises have to a greater extent undertaken strategies that are less favorable to domestic activity: the majority have chosen horizontal (or pure vertical) FDI instead of complex FDI. However, given the limited sample size, the results have to be taken with extreme caution and considered mainly indicative.

6. Conclusions

In this paper we study the relationship between domestic and foreign activities on different samples of Italian manufacturing firms using two complementary econometric models. Compared with the previous literature, our analysis benefits from a richer set of qualitative and quantitative information.

Both methodologies suggest that overall domestic and foreign activities are more likely to be complements than substitutes. In the first model, the less favorable estimates show that two years after the investment, sales and productivity decrease, but only for firms that undertake horizontal FDI. This drop does not happen in vertical-complex FDI. As regards the employment and skill composition of workforce, there are no significant effects. If anything, the impact turns out to be more positive than negative, especially for employment in vertical-complex FDI. Over a longer time span (six years), our second model shows a positive correlation between domestic and foreign employment, in particular for the higher-skilled workforce and for firms that undertake complex strategies of internationalization.

Overall, our results do not contrast with those obtained by the previous empirical studies, namely by Castellani et al. (2008) and Barba-Navaretti et al. (2010) for Italy and Becker and Muendler (2008) for German firms. More specifically, our findings are in line with those of the first paper, which shows a positive impact of internationalization on high-skilled employment. However, they are less positive than those obtained by the second paper, where a significant increase in productivity, output and employment of switching firms is found immediately after the investment.

It is worth recalling that, having investigated only FDI, our analysis does not take into account the effects of off-shoring - i.e. international outsourcing - which may affect domestic production as well as FDI. Moreover, our study mainly focuses on medium- and especially large-sized firms (the first model is based on a sample of firms with at least 50 employees; the second, on firms with at least with 20 employees). Therefore, it is possible that our conclusions do not fully apply to smaller enterprises investing abroad. Finally, we have observed a limited time period, up to six years, while internationalization may display effects over a longer time span. These issues represent interesting topics for the future research.

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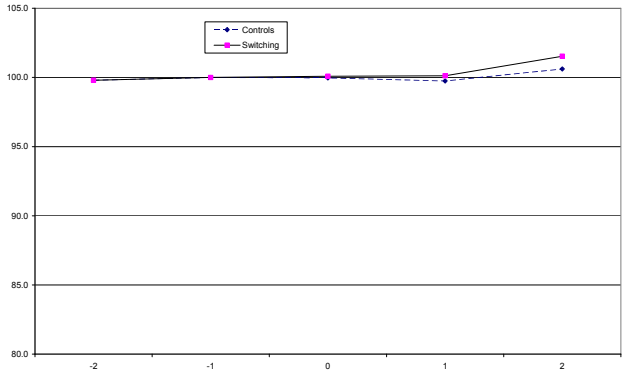
Figures and Tables

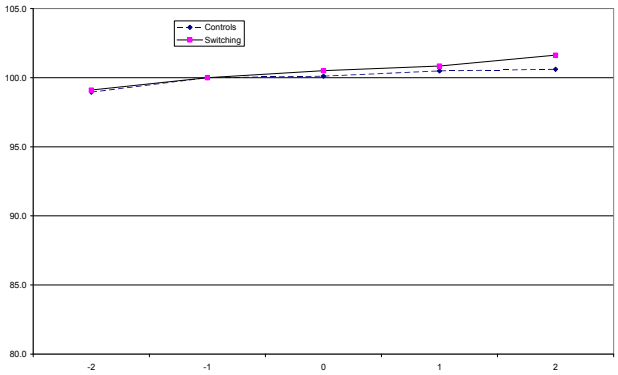
Fig. 1. Matching # 1 –Switching vs. other domestic firms

Unconditional means (variables in log) - Index=100 at t*-1

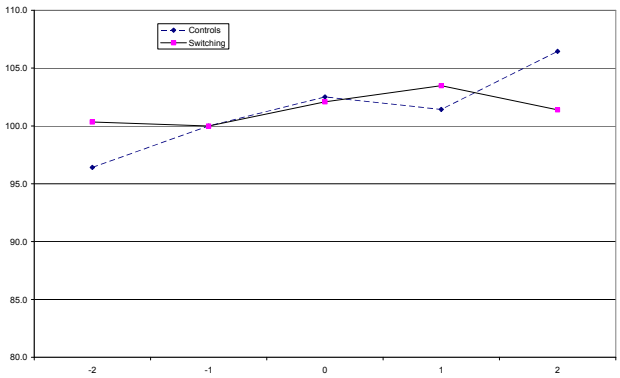
Employment



Sales



Skill intensity



Sales/Employment

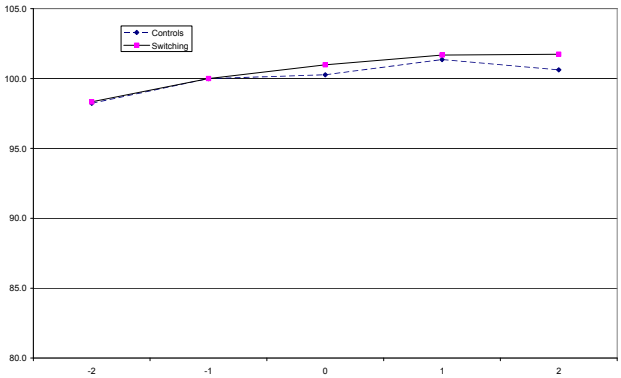
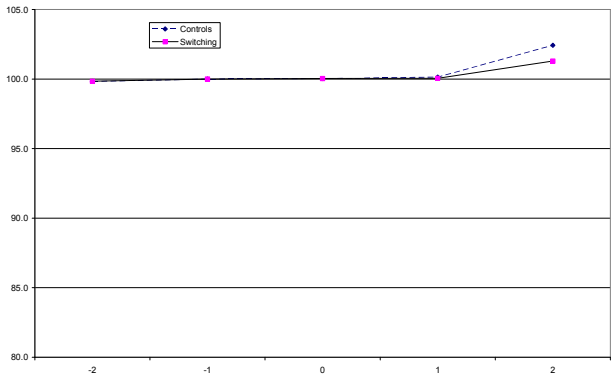


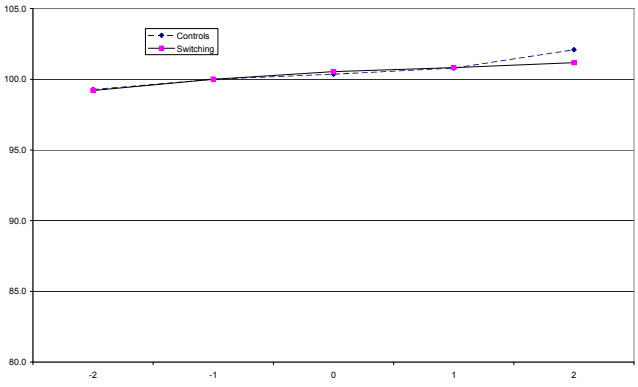
Fig. 2. Matching 2 –Switching vs. near-investing domestic firms

Unconditional means (variables in log) - Index=100 at t*-1

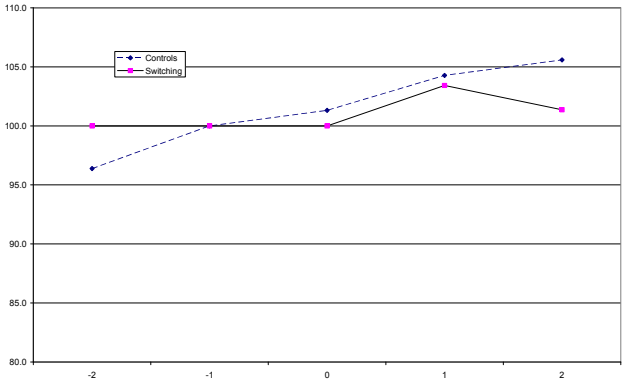
Employment



Sales



Skill intensity



Sales/Employment

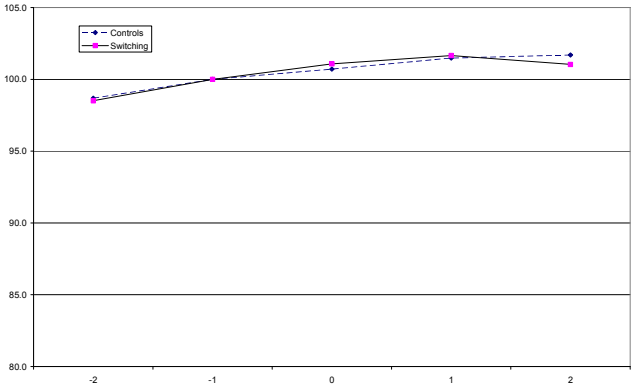


Table 1

Means, standard deviations and standard errors in 2004

(Standard deviation in round brackets; standard errors of the means in square brackets)

	Multinationals (MN)			Domestic firms (DF)	
	All MNEs	Switching	Switching in 2003-2004	Near-investing abroad	Other DF
	(1)	(2)	(3)	(4)	(5)
Employees	639.2 (968.4) *[58.93]*	627.6 (829.7) *[87.95]*	326.6 (357.9) *[70.21]*	332.6 (635.9) *[38.00]*	238.9 (523.5) *[15.66]*
Sales	215017 (523592) *[31864.79]*	155560 (240979) *[25543.72]*	69870 (73923) *[14497.57]*	89924 (195823) *[11702.72]*	69877 (244092) *[7300.19]*
Exports	93234 (223918) *[13627.24]*	73555 (138029) *[14631.06]*	33079 (33985) *[6665.02]*	40946 (124515) *[7441.25]*	19593 (66537) *[1989.96]*
Exports/Sales	0.478 (0.253) *[0.02]*	0.498 (0.235) *[0.02]*	0.512 (0.270) *[0.05]*	0.399 (0.299) *[0.02]*	0.291 (0.300) *[0.01]*
Investment	6077 (14247) *[867.06]*	5845 (12362) *[1310.40]*	2019 (2458) *[482.11]*	3187 (8596) *[513.71]*	2731 (10666) *[319.00]*
Skill intensity	0.384 (0.199) *[0.01]*	0.368 (0.193) *[0.02]*	0.371 (0.222) *[0.04]*	0.363 (0.217) *[0.01]*	0.296 (0.193) *[0.01]*
Sales/employees	322.7 (822.1) *[50.03]*	242.8 (163.4) *[17.32]*	230.2 (144.2) *[28.28]*	260.1 (280.3) *[16.75]*	251.1 (717.2) *[21.45]*
Investment/employees	8.496 (11.781) *[0.72]*	9.027 (11.931) *[1.26]*	7.285 (7.917) *[1.55]*	8.634 (15.052) *[0.90]*	10.011 (19.748) *[0.59]*
Start year	1963.8 (31.3) *[1.92]*	1959.9 (28.5) *[3.04]*	1964.2 (24.7) *[4.84]*	1969.5 (27.3) *[1.64]*	1970.4 (26.3) *[0.79]*
Profits	2.31 (1.21) *[0.08]*	2.43 (1.59) *[0.13]*	2.54 (1.25) *[0.26]*	2.39 (1.17) *[0.07]*	2.38 (1.08) *[0.03]*
Wages	25523 (5847.8) *[387.28]*	24612 (5842) *[679.23]*	24747 (8097) *[1963.91]*	25181 (8242) *[539.97]*	24276 (7350) *[241.94]*
Wages of skilled	31662 (7158.2) *[477.21]*	30653 (7843) *[911.76]*	27925 (11604) *[2814.49]*	31207 (10014) *[661.78]*	30330 (9271) *[307.03]*
Wages of unskilled	21440 (4761.4) *[316.03]*	20529 (4582) *[529.17]*	19966 (6188) *[1500.89]*	21360 (6118) *[406.10]*	21230 (5781) *[191.88]*
Research and development	3515 (20965) *[1450.24]*	3547 (12948) *[1547.69]*	2019 (5067) *[1162.51]*	1111 (5018) *[330.89]*	499 (4308) *[143.46]*
Number of firms	270	89	26	280	1,118

Notes: (1) All MNEs are firms that produce goods or services abroad; (2) Switching firms are firms that switch from domestic to MNE and that are in the survey from 2 years before up to 1 year after the investment abroad; (3) Switching in the years 2003-04; (4) "Near-investing abroad" are firms that have thought of investing abroad but that have not yet done so; (5) "Other DF" are firms that did have neither invested abroad nor considered the possibility of doing so. All nominal variables are in thousands of euros, except wages, which are in euros. Skill intensity is the ratio of non-worker employees to total employment (white collar/total employment). Profits range from 1 (strongly positive) to 5 (strongly negative). Research and development are outlays in R&D activities. Only manufacturing firms are in the samples. The five largest firms (more than 8000 employees) have been excluded.

Table 2

Distribution of switching firms

Year of switching	%	Sector	%	Region of firm's localization	%
1989	1.2	Food, beverages and tobacco	3.5	Piedmont and Aosta Valley	15.3
1990	1.2	Textiles and clothing	10.6	Lombardy	22.4
1991	1.2	Leather products	7.1	Liguria	3.5
1992	4.7	Wood and wood products	1.2	Trentino-Alto Adige	1.2
1993	1.2	Paper, printing and publishing	4.7	Veneto	7.1
1994	7.1	Chemical products	4.7	Friuli-Venezia Giulia	12.9
1995	9.4	Rubber and plastic products	4.7	Emilia-Romagna	10.6
1996	2.4	Non-metallic mineral products	7.1	Tuscany	4.7
1997	1.2	Basic metal industries	4.7	Umbria	2.4
1998	7.1	Machinery and equipment	20.0	Marche	5.9
1999	10.6	Electrical machinery, accounting and computing machinery	16.5	Lazio	1.2
2000	9.4	Transport equipment	5.9	Abruzzi	2.4
2001	8.2	Other manufacturing industries	9.4	Campania	2.4
2002	8.2			Puglia	5.9
2003	7.1			Basilicata	1.2
2004	20.0			Sardinia	1.2
Total	100.0	Total	100.0	Total	100.0

Notes: The table reports the distribution of matching #1 sample of switching. It would change only marginally if we used the sample of switching firms of matching #2.

Table 3

Baseline results: Difference-in-Differences estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Matching #1 - *Switching vs. domestic firms*				Matching #2 - *Switching vs. near investing firms*			
	(t*+1)		(t*+2)		(t*+1)		(t*+2)	
log Employment	0.022	0.022	0.039	0.039	-0.005	-0.005	0.010	0.010
	(0.029)	(0.028)	(0.034)	(0.036)	(0.023)	(0.023)	(0.035)	(0.033)
log Sales	0.039	0.039	0.096	0.096	0.004	0.004	-0.059	-0.059
	(0.039)	(0.040)	(0.061)	(0.065)	(0.041)	(0.043)	(0.050)	(0.046)
log Skill intensity	0.006	0.006	-0.001	-0.001	-0.002	-0.002	-0.008	-0.007
	(0.007)	(0.008)	(0.010)	(0.012)	(0.007)	(0.009)	(0.009)	(0.011)
log Sales/Empl.	0.017	0.017	0.056	0.056	0.008	0.008	-0.069	-0.069
	(0.034)	(0.036)	(0.049)	(0.057)	(0.036)	(0.030)	(0.044)	(0.048)
Region, year and pair dummies	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Observations	*340*	*340*	*300*	*300*	*328*	*328*	*272*	*272*

Notes: The pre-program period taken as reference for the DID estimates is one year before the first investment abroad (t*-1). Columns 1-4 give the results for matching # 1 (switching vs. domestic firms); columns 5-8 the results for matching # 2 (switching vs. "near investing" firms). Bootstrapped standard errors clustered by firms in brackets. * p-value<0.10, ** p-value <0.05, *** p-value <0.01.

Table 4

Difference-in-Differences estimates by type of FDI

	Model without fixed effects				*Model with fixed effects*			
	Vertical or complex	Horizontal	Vertical or complex	Horizontal	Vertical or complex	Horizontal	Vertical or complex	Horizontal
	(t*+1)		(t*+2)		(t*+1)		(t*+2)	
	Matching #1 - Switching vs. domestic firms							
log Employment	0.028	0.017	0.060*	0.022	0.033	0.013	0.071**	0.013
	(0.033)	(0.029)	(0.034)	(0.037)	(0.036)	(0.031)	(0.034)	(0.037)
log Sales	0.069	0.014	0.143*	0.057	0.064	0.018	0.133*	0.065
	(0.051)	(0.041)	(0.084)	(0.051)	(0.057)	(0.045)	(0.072)	(0.071)
log Skill intensity	0.004	0.008	-0.000	-0.002	0.004	0.007	0.000	-0.003
	(0.007)	(0.011)	(0.011)	(0.014)	(0.006)	(0.012)	(0.012)	(0.015)
log Sales/Empl.	0.041	-0.003	0.081	0.034	0.031	0.006	0.061	0.051
	(0.047)	(0.042)	(0.074)	(0.057)	(0.046)	(0.052)	(0.085)	(0.062)
	Matching #2 - Switching vs. near investing firms							
log Employment	0.005	-0.012	0.037	-0.009	-0.003	-0.005	0.034	-0.007
	(0.028)	(0.025)	(0.035)	(0.038)	(0.024)	(0.030)	(0.039)	(0.034)
log Sales	0.039	-0.025	0.011	-0.112**	0.016	-0.007	-0.002	-0.102**
	(0.046)	(0.038)	(0.059)	(0.052)	(0.060)	(0.047)	(0.072)	(0.049)
log Skill intensity	-0.003	-0.002	-0.008	-0.008	-0.001	-0.003	-0.004	-0.009
	(0.007)	(0.012)	(0.011)	(0.015)	(0.007)	(0.012)	(0.011)	(0.019)
log Sales/Empl.	0.034	-0.013	-0.026	-0.102**	0.020	-0.001	-0.037	-0.093**
	(0.046)	(0.038)	(0.063)	(0.042)	(0.046)	(0.041)	(0.060)	(0.040)
Region, year and pair dummies	*No*		*No*		*Yes*		*Yes*	

Notes: The pre-program period taken as reference for the DID estimates is one year before the first investment abroad (t*-1). Bootstrapped standard errors clustered by firms in brackets. * p-value<0.10, ** p-value <0.05, *** p-value <0.01. Vertical or complex firms are firms that experienced a fall in the value added sales ratio of more than 5% after the investment abroad. Observations at t*+1 (t*+2) are 340 (300) in the first matching and 328 (272) in the second, respectively.

Table 5

Alternative empirical strategy

Dependent variable: Δlog *Domestic Employment (2000-2006)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Total employment				White collars				Blue collars				Robustness: Model without outliers		
	OLS			IV	OLS			IV	OLS			IV	Total employ.	White-collars	Blue-collars
Δ log Foreign Empl.	0.018 (0.011)	0.017 (0.012)	0.018 (0.013)	0.038 (0.032)	0.032** (0.015)	0.029* (0.016)	0.036** (0.016)	0.060** (0.026)	0.013 (0.016)	0.012 (0.014)	0.011 (0.019)	0.022 (0.044)	0.017 (0.011)	0.031** (0.014)	0.005 (0.016
Δ log Domestic Sales	0.437*** (0.157)	0.436** (0.172)	-0.037 (0.803)	-0.254 (0.983)	0.354*** (0.094)	0.362*** (0.099)	0.253 (0.589)	-0.003 (0.685)	0.421 (0.219)	0.417 (0.231)	-0.499 (1.163)	-0.617 (1.395)	0.137 (0.886)	0.655 (0.512)	0.463 (0.891)
Δ log Domestic Sales^2	_	_	0.024 (0.037)	0.032 (0.045)	_	_	0.008 (0.026)	0.018 (0.031)	_	_	0.043 (0.054)	0.048 (0.064)	0.011 (0.041)	-0.013 (0.022)	-0.009 (0.041)
Sector fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
R2	0.34	0.41	0.51	0.49	0.25	0.32	0.53	0.52	0.20	0.41	0.42	0.38	0.49	0.57	0.27
First-stage F-test				35.18				35.18				35.18			
Obs.	101	101	101	101	101	101	101	101	101	101	101	101	96	97	97

Notes: Δy is the difference in the variable y between 2006 and 2000. IV columns report the results of 2SLS estimates taking log *foreign employment*$_{2000}$ as instrument for Δlog *foreign employment*. Since some firms had zero foreign employment in 2000 a unit constant has been added to the variables to calculate the logarithm. Robust standard errors in brackets. *, **,***: significant at 10%, 5%, 1% respectively. Last three columns report the results of the models estimated by OLS excluding the 1st and 99th percentile of the distribution of the domestic employment growth.

Table 6

Alternative empirical strategy: Results by type of investment

Dependent variable: Δlog *Domestic Employment (2000-2006)*

	(1)	(2)	(3)
	Total employment	White-collars	Blue-collars
Δ log Foreign Employment_Vertical	0.008	0.014	0.018
	(0.021)	(0.025)	(0.026)
Δ log Foreign Employment_Horizontal	0.009	0.018	0.001
	(0.018)	(0.028)	(0.026)
Δ log Foreign Employment_Complex	0.031	0.068**	0.006
	(0.034)	(0.034)	(0.052)
Δ log Foreign Employment_Other	0.039	0.073	0.017
	(0.041)	(0.047)	(0.048)
Δ log Domestic Sales	-0.126	0.067	-0.446
	(0.882)	(0.068)	(1.244)
Δ log Domestic Sales^2	0.026	0.014	0.041
	(0.041)	(0.030)	(0.057)
Sector fixed effects	Yes	Yes	Yes
Regional fixed effects	Yes	Yes	Yes
R2	0.51	0.56	0.39
Obs.	101	101	101

Notes: Robust standard errors in brackets. *, **,***: significant at 10%, 5%, 1% respectively. OLS estimates. We break down the firms by type of investment abroad according their answers: those that indicated labor costs (proximity to final markets) as important or very important are considered *vertical* (*horizontal*). Those that answered both reasons were important or very important are classified *complex*; *other* gathers firms that indicated other reasons (tax system, laws and regulations, etc.).

Table 7

Expanding vs. non-expanding multinationals

	Mean differences in 2000 (st. error)			DID Results Dep var: log Domestic employment	
	Domestic employment	Domestic sales	Exports	(1)	(2)
First method: Expanding=1 if Δlog (Foreign Empl.)>0	62.4 (293.1)	-1534.3 (97006.7)	8806.7 (40727.8)	0.231** (0.096)	0.232** (0.104)
Second method: Expanding=1 if Δlog (Foreign Empl.)>Median	-105.3 (248.07)	-102443.3 (78630)	-31177.4 (33150)	0.135* (0.071)	0.135* (0.077)
Sector and regional FE	_	_	_	No	Yes

Notes: Robust standard errors clustered by firms in brackets. *, **,***: significant at 10%, 5%, 1% respectively. OLS estimates. With the first method expanding firms are multinationals that experienced a growth of foreign employment between 2000 and 2006; the others are non-expanding; with the second method, expanding firms are those that experienced a change greater than the median. In the first group there are 74 expanding and 24 non-expanding firms; in the second group there are 51 expanding and 47 non-expanding firms. DID results report the estimates of the coefficient γ, in the equation (6). The observations are 196.

Appendix

Table A1

Matching # 1: Switching vs. domestic firms

Means and standardized differences over the two years before the investment abroad (one year before for growth rates)

	Means (standard deviation)		Mean difference (st-error)	Standardized difference
	Switching firms	Controls of switching firms		
Employment	615.5 (856.4)	621.4 (796.2)	-5.9 (78.1)	-0.7
Sales	105567 (135996)	109350 (135996)	-3782 (14165)	-2.6
Exports/sales	0.496 (0.234)	0.475 (0.265)	0.021 (0.024)	8.4
Investment	5917 (12031)	4309 (6792)	1608 (977)	16.5
Sales/employment	193.7 (116.7)	200.1 (136.99)	-6.3 (8.3)	-5.0
Skill intensity	0.343 (0.172)	0.332 (0.212)	0.012 (0.0191)	6.2
Investment/empl.	9.561 (10.047)	8.980 (14.920)	0.581 (1.255)	4.6
Start year	1960.7 (22.3)	1961.7 (24.9)	-0.986 (2.835)	-4.2
Profits	2.16 (0.969)	1.97 (0.938)	0.18 (0.12)	19.7
Employment growth rate %	1.18 (9.10)	1.29 (9.022)	-0.11 (1.27)	-1.3
Sales growth rate %	9.86 (16.9)	11.46 (41.5)	-1.60 (4.47)	-5.1
Sales/Empl. growth rate %	8.67 (17.67)	10.16 (41.67)	-1.48 (4.73)	-4.6
Skill intensity growth rate %	0.83 (21.06)	5.04 (28.5)	-4.20 (38.18)	-16.8
Number of firms	85	68	–	–

Notes: Standardized difference of the variable $y = 100*(1/N)[\Sigma_i(y_i)- \Sigma_j(y_j)]/[Var(y_i)+Var(y_j)/2]^{1/2}$, where i denotes switching firms and j firms of the control group.

Table A2

Matching # 2: Switching vs. Near-investing domestic firms

Means and standardized differences over the two years before the investment abroad (one year before for growth rates)

	Means (standard deviation)		Mean difference (st-error)	Standardized difference
	Switching firms	Controls of switching firms		
Employment	454.7 (402.5)	465.4 (613.2)	-10.7 (53.6)	-2.1
Sales	85913 (90349)	86158 (115373)	-245 (10422)	-0.2
Exports/sales	0.487 (0.243)	0.455 (0.274)	0.031 (0.022)	12.0
Investment	4126 (5862)	3678 (4772)	448 (485)	8.4
Sales/employment	196.8 (11739)	207.2 (152.6)	-10.44 (13.34)	-7.7
Skill intensity	0.350 (0.173)	0.361 (0.179)	-0.011 (0.018)	-6.7
Investment/empl.	9.54 (10.11)	9.74 (19.01)	-0.21 (1.61)	-1.4
Start year	1961.5 (21.64)	1958.6 (31.55)	2.86 (3.124)	10.6
Profits	2.233 (1.004)	2.049 (1.175)	0.173 (0.146)	15.9
Employment growth rate %	0.94 (10.01)	1.03 (8.76)	-0.09 (1.41)	-1.0
Sales growth rate %	8.72 (18.4)	7.92 (19.4)	0.79 (2.62)	4.1
Sales/Empl. growth rate %	7.79 (18.42)	6.89 (19.48)	0.88 (2.58)	4.7
Skill intensity growth rate %	1.41 (22.05)	5.05 (25.08)	-3.64 (3.73)	-15.4
Number of firms	82	59	–	–

Notes: Standardized difference of the variable $y = 100*(1/N)[\Sigma_i(y_i)- \Sigma_j(y_j)]/[Var(y_i)+Var(y_j)/2]^{1/2}$, where i denotes switching firms and j firms of the control group.

Table A3

Robustness: Recent switching samples

Means and standardized differences over the two years before the investment abroad (one year before for growth rates)

	Matching # 1		Matching # 2	
	Mean difference (st-error)	Standardized difference	Mean difference (st-error)	Standardized difference
Employment	-165.6** (78.7)	-24.6	57.2 (41.7)	15.7
Sales	-29814* (17341)	-21.2	8527 (11155)	8.7
Exports	92 (8985)	0.1	12825* (6646)	23.6
Exports/sales	0.069*** (0.030)	27.6	0.027 (0.028)	10.3
Investment	-166 (790)	-2.3	935 (608)	16.3
Sales/employment	-10.79 (10.23)	-8.0	-12.89 (18.29)	-8.7
Skill intensity	-0.008 (0.023)	-4.1	-0.024 (0.025)	-12.6
Investment/empl.	0.79 (1.89)	5.3	0.11 (2.28)	0.7
Start year	-2.10 (3.40)	-9.3	3.21 (3.93)	11.5
Profits	0.23 (0.14)	23.6	0.26 (0.15)	23.4
Employment growth rate %	-0.22 (1.46)	-2.8	-1.2 (1.5)	-14.8
Sales growth rate %	4.46 (2.74)	26.5	-0.6 (3.2)	-3.3
Sales/Empl. growth rate %	4.68 (2.97)	28.5	0.53 (3.1)	2.7
Skill intensity growth rate %	-0.078 (0.057)	-26.0	-5.7 (5.3)	-20.5

Notes: Recent switching firms are those that invested after 1998. The number of switching firms in matching #1 (matching #2) is 54 (57) and the firms in the control group 41 (34). See also notes to Table A1.

Table A4

Robustness: Control groups chosen among recent switching firms and baseline results excluding outliers

DID estimation results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Matching #1 - *Switching vs. domestic firms*				Matching #2 - *Switching vs. near investing firms*			
	(t*+1)		(t*+2)		(t*+1)		(t*+2)	
				A. Only recent switching firms				
log Employment	-0.006	-0.007	0.009	-0.000	-0.015	-0.015	0.025	0.008
	(0.028)	(0.035)	(0.036)	(0.037)	(0.022)	(0.025)	(0.042)	(0.036)
log Sales	0.014	0.014	0.024	0.052	-0.016	-0.016	-0.052	-0.033
	(0.047)	(0.051)	(0.062)	(0.068)	(0.046)	(0.056)	(0.059)	(0.064)
log Skill intensity	0.011	0.011	0.021	0.022	-0.006	-0.004	-0.006	-0.004
	(0.010)	(0.011)	(0.013)	(0.015)	(0.011)	(0.012)	(0.012)	(0.014)
log Sales/Empl.	0.021	0.021	0.015	0.052	-0.001	-0.001	-0.077	-0.042
	(0.042)	(0.048)	(0.060)	(0.061)	(0.041)	(0.041)	(0.051)	(0.054)
				B. Baseline sample without outliers				
log Employment	_	_	0.020	0.018	_	_	0.012	0.006
			(0.025)	(0.028)			(0.029)	(0.031)
log Sales	_	_	0.086	0.085	_	_	-0.064	-0.067
			(0.055)	(0.059)			(0.051)	(0.042)
log Skill intensity	_	_	-0.006	-0.006	_	_	-0.008	-0.007
			(0.007)	(0.010)			(0.007)	(0.008)
log Sales/Empl.	_	_	-0.009	-0.010	_	_	-0.073*	-0.071
			(0.039)	(0.036)			(0.038)	(0.039)
Region, year and pair dummies	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*

Notes: The pre-program period corresponds to one year before the first investment abroad (t*-1). Columns 1-4 contain the results for matching # 1 (switching vs. domestic firms); columns 5-8 the results for matching # 2 (switching vs. "near investing" firms). Bootstrapped standard errors clustered by firms in brackets. * p-value<0.10, ** p-value <0.05, *** p-value <0.01. In panel A the number of observations in the first matching at t+1 is 216 (at t+2: 198); in the second matching at t+1 there are 228 observations (at t+2: 192) In panel B the number of observations in the first (second) matching is 292 (264). Panel B reports the estimates of the baseline model excluding the 1st and 99th percentile of the distribution of the time-change rate of each outcome variable.

Table A5

Results by geographical area: Difference-in-Differences estimates

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Matching #1 - *Switching vs. domestic firms*								Matching #2 - *Switching vs. near investing firms*							
	(t*+1)				(t*+2)				(t*+1)				(t*+2)			
	Coeff.	St. err.	Coeff.	St. err.	Coeff.	St. err.	Coeff.	St. err.	Coeff.	St. err.	Coeff.	St. err.	Coeff.	St. err.	Coeff.	St. err.
log Employment	0.002	(0.031)	0.014	(0.038)	0.003	(0.038)	0.024	(0.042)	-0.031	(0.027)	-0.035	(0.032)	-0.024	(0.041)	-0.034	(0.044)
North East	0.029	(0.033)	-0.010	(0.041)	0.041	(0.045)	-0.008	(0.053)	0.031	(0.026)	0.009	(0.035)	0.011	(0.043)	-0.008	(0.038)
Center South	0.038	(0.040)	0.040	(0.0489	0.093**	(0.042)	0.076	(0.048)	0.059	(0.0389	0.096*	(0.050)	0.123**	(0.049)	0.188***	(0.053)
log Sales	0.084	(0.052)	0.061	(0.0629	0.076	(0.066)	0.048	(0.093)	0.046	(0.049)	0.032	(0.048)	-0.074	(0.062)	-0.120**	(0.052)
North East	-0.049	(0.059)	-0.023	(0.065)	-0.000	(0.076)	0.059	(0.095)	-0.042	(0.049)	-0.055	(0.061)	-0.037	(0.079)	0.009	(0.064)
Center South	-0.108	(0.076)	-0.051	(0.088)	0.080	(0.105)	0.114	(0.109)	-0.102	(0.080)	-0.039	(0.076)	0.109	(0.087)	0.229**	(0.112)
log Skill intensity	0.014	(0.012)	0.016	(0.015)	0.018	(0.015)	0.016	(0.017)	0.008	(0.016)	0.013	(0.012)	0.012	(0.016)	0.018	(0.015)
North East	-0.013	(0.013)	-0.016	(0.014)	-0.021	(0.016)	-0.017	(0.015)	-0.010	(0.015)	-0.019*	(0.011)	-0.015	(0.016)	-0.021	(0.016)
Center South	-0.014	(0.013)	-0.015	(0.016)	-0.050*	(0.026)	-0.049	(0.031)	-0.025	(0.0189	-0.032*	(0.017)	-0.057**	(0.026)	-0.074**	(0.029)
log Sales/Empl.	0.082*	(0.047)	0.046	(0.044)	0.073	(0.062)	0.023	(0.074)	0.077*	(0.042)	0.067	(0.048)	-0.049	(0.049)	-0.085*	(0.051)
North East	-0.079	(0.019)	-0.013	(0.061)	-0.041	(0.062)	0.067	(0.107)	-0.072	(0.048)	-0.064	(0.055)	-0.048	(0.071)	0.018	(0.055)
Center South	-0.146*	(0.077)	-0.091	(0.064)	-0.012	(0.092)	0.037	(0.100)	-0.160*	(0.059)	-0.135*	(0.074)	-0.014	(0.078)	0.039	(0.092)
Region, year and pair dummies	*No*		*Yes*		*No*		*Yes*		*No*		*Yes*		*No*		*Yes*	
Observations	*340*		*340*		*300*		*300*		*328*		*328*		*272*		*272*	

Notes: The pre-program period taken as reference for the DID estimates is one year before the first investment abroad (t*-1). Columns 1-4 give the results for matching # 1 (switching vs. domestic firms); columns 5-8 the results for matching # 2 (switching vs. "near investing" firms). Bootstrapped standard errors clustered by firms in brackets. * p-value<0.10, ** p-value <0.05, *** p-value <0.01.

Table A6

Alternative empirical strategy: Results by geographical area

Dependent variable: Δlog *Domestic Employment (2000-2006) – OLS estimates*

	(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)
	Total employment			White collar			Blue collars		
Δ log Foreign Empl.	0.041***	0.043**	0.037**	0.046**	0.049**	0.039*	0.044**	0.045*	0.038*
	(0.015)	(0.016)	(0.014)	(0.018)	(0.020)	(0.020)	(0.021)	(0.023)	(0.020)
North East	-0.071**	-0.072**	-0.070*	-0.106**	-0.107**	-0.106**	-0.056	-0.057	-0.054
	(0.035)	(0.034)	(0.037)	(0.041)	(0.040)	(0.047)	(0.046)	(0.046)	(0.047)
Center South	-0.032	-0.029	-0.028	0.004	0.009	0.017	-0.062*	-0.060*	-0.053
	(0.026)	(0.025	(0.025)	(0.035)	(0.036)	(0.039)	(0.035)	(0.035)	(0.035)
Δ log Domestic Sales	0.459***	-0.108	0.451	0.367***	-0.619	0.356***	0.454**	0.100	0.443*
	(0.149)	(0.653)	(0.171)	(0.091)	(0.693)	(0.097)	(0.206)	(0.871)	(0.230)
Δ log Domestic Sales^2	-	0.024	-	-	0.042	-	-	0.015	-
		(0.031)			(0.030)			(0.041)	
Sector fixed effects	No	No	Yes	No	Yes	Yes	No	Yes	Yes
R2	0.38	0.39	0.45	0.33	0.34	0.40	0.23	0.24	0.32
Obs.	101	101	101	101	101	101	101	101	101

Notes: Δy is the difference of the variable y between 2006 and 2000. Since some firms had zero foreign employment in 2000 a unit constant has been added to the variables to calculate the logarithm. Robust standard errors in brackets. *, **,***: significant at 10%, 5%, 1% respectively. The model includes the constant and two dummies for north-eastern and central and southern firms.

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